Design of Micro Strip Patch Antenna

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Abstract— This paper present design of microstrip rectangular patch antenna for 5.8GHz. The microstrip antenna has advantages because of which it make progress in recent years. In this paper we discuss micro strip antenna design at 5.8Ghz frequency using IE3D software.

Key words: Data Mining, Heart Disease Risk Factors

I. INTRODUCTION

High antenna directivity, required in space applications is usually achieved by using either parabolic reflector or line fed antenna arrays or by using reflect arrays. The parabolic reflector has the disadvantage due to its shape which comes as an obstruction in space and mobile applications. Beside this there are mechanical problems and installation difficulties associated with parabolic reflector. An alternative to this is microstrip antenna which also have the disadvantage of low efficiency due to line losses and high cross polar radiation by the feed line network.

A. Designing Steps

Step 1: Calculation of the Width (W): The width of the Microstrip patch antenna is given by

\[ W = \frac{c}{2f_0 \sqrt{(\varepsilon_r + 1) / 2}} \]

Substituting \( c = 3e8 \text{ m/s}, \varepsilon = 2.55 \) and \( f = 5.8 \text{ GHz} \), we get:

\( W = 19.411 \text{ mm} \)

Step 2: Calculation of Effective dielectric constant (\( \varepsilon_{reff} \)):

\[ \varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r - 1}{2} \left[ 1 + 12 \frac{h}{W} \right]^{1/2} \]

Substituting \( \varepsilon = 2.55, W = 19.411 \text{ mm} \) and \( h = 1.5 \text{ mm} \) we get:

\( \varepsilon_{reff} = 2.8509 \)

Step 3: Calculation of the Effective length (\( L_{eff} \)):

\[ L_{eff} = \frac{c}{2f_0 \sqrt{\varepsilon_{reff}}} \]

\[ \Delta L = 0.412h \left( \frac{\varepsilon_{reff} + 0.3}{\varepsilon_{reff}} \right) \frac{W}{h} + 0.264 \]

\[ \frac{\varepsilon_{reff} - 0.258}{\varepsilon_{reff}} \frac{W}{h} + 0.8 \]

Substituting \( \varepsilon_{reff} = 2.8509, c = 3e8 \text{ m/s} \) and \( f = 5.8 \text{ GHz} \) we get: \( L_{eff} = 15.311 \text{ mm} \)

Step 4: Calculation of the length extension (\( \Delta L \)):

Substituting \( \varepsilon_{reff} = 2.8509, W = 19.411 \text{ mm} \) and \( h = 1.5 \text{ mm} \) we get: \( \Delta L = 0.7217 \)

Step 5: Calculation of actual length of patch (\( L \)):

\[ L = L_{eff} - 2\Delta L \]

Substituting \( L_{eff} = 13.83 \text{ mm} \) and \( \Delta L = 0.7392 \text{ mm} \) we get:

\( L = 13.866 \text{ mm} \)
II. RESULT

A. Smith Chart

Fig. 1:

Fig. 2:
B. *Db and Phase of S Parameter*

![Fig. 3: Efficiency](image1)

![Fig. 4: Gain](image2)

### III. CONCLUSION

The present state of work include design of rectangular microstrip Antenna for 5.8Ghz. The rectangular patch is designed using IE3D software with gain of 6.32 db and efficiency of 75%.

### REFERENCES


